MODIS
SCIENCE DATA SUPPORT TEAM
PRESENTATION

April 3, 1992

AGENDA

ACTION ITEMS:

01/17/92 [Tom Goff]: Have a polished version (with peer review) of the file dump routine ready for the MODIS Science Team Meeting. (Copies of the finished version together with RDC internal review comments are in the hands of the SDST software review committee.) STATUS: Open. Due date 04/01/92.

02/21/92 [Ed Masuoka]: Talk to Code 930 and find out what tools they have for porting data between computers from different vendors. (Ed will give a summary at the 04/03/92 meeting of the results of his discussions.) STATUS: Open. Due date 03/13/92.

02/21/92 [Lloyd Carpenter and Team]: Identify a list of risks associated with porting Team Members' algorithms to the PGS. Prepare these for discussion at the Science Team Meeting. STATUS: Open. Due date 04/01/92.

03/20/92 [Lloyd Carpenter]: Gather the MODIS Data Product Attributes information, and write a cover letter to Team Members for updating the information, and discussion at the Team Meeting. (An updated version of the letter has been prepared and delivered.) STATUS: Open. Due date 03/27/92.

MODIS Airborne Simulator status (Liam Gumley)

Progress up to 02 April 1992

(1) MAS data processing status

Flight Date	Area covered during flight	Level-0 data received	Processing completed	INS offset fixed
10/31/91	Ames test flight CA/NV	yes	3/3 tracks	yes
11/12/91	Ferry flight CA to TX	yes (subset)	1/1 tracks	no
11/14/91	Coffeyville KS	yes	16/16 tracks	no
11/18/91	Coffeyville KS	yes	14/14 tracks	yes
11/21/91	Coffeyville KS	yes		
11/22/91	Coffeyville KS	yes		
11/24/91	Gulf coast TX/LA	yes		
11/25/91	Coffeyville KS	yes		
11/26/91	Coffeyville KS	yes		
12/03/91	Gulf coast TX/LA	yes		
12/04/91	Gulf coast TX/LA	yes		
12/05/91	Coffeyville KS	yes	29/29 tracks	no
12/07/91	Coffeyville KS	yes		
11/16/91	Ground visible calibration	yes	10481 scanlines (no navigation)	
11/20/91	Ground visible calibration	yes	6078 scanlines (no navigation)	
11/23/91	Ground visible calibration	yes	10281 scanlines (no navigation)	

(2) MAS Level-1 processing system software transfer to EOS project

A complete version of the current MAS Level-1 software was transferred to Sol Broder's account on LTPIRIS2 on 04/01/92. This included

- source code for the processing programs,
- compilation instructions for the source code,
- a sample MAS and INS Level-0 data set,
- an automated shell script for processing the test data,
- sample output for all processing programs for comparison,
- Iris executable copies of the processing programs.

One thousand scan lines of MAS data from the 18-NOV-1991 FIRE flight were provided, as well as a complete INS data set. The size of the dataset provided was limited by the disk space available on the proposed target machine. The total volume of data/code supplied was 28,200,960 bytes. Sol has asked that I run through the processing sequence with one of his people, and it is expected that this will be done after the Science Team meeting. I also advised Sol of the existence of the MAS anonymous FTP site and gave him instructions on how to access it.

(3) MAS software development

A subtle bug in the geolocation software has been discovered. This bug apparently causes the last flight line of a MAS mission to be geolocated incorrectly. It appears that only the last flight line is affected by this problem for any given mission. However it is possible that other flight lines will contain some records with invalid geolocation data at the start or the end of the

file. In either case, the presence of invalid geolocation data may be checked by a new version of the masdump utility, which is now available from the MAS anonymous FTP site. This utility now checks the first and last 500 records in a flight track file, and reports where it finds the first and last records with valid geolocation data. This utility has been compiled and tested on both the Silicon Graphics Iris (Irix 3.3.2) and DEC VAX (VMS 5.3). The bug in the geolocation software is currently being investigated, and a fix will be implemented as soon as possible. In the meantime users have been advised to check the last flight line for each mission for valid geolocation data using masdump.

The visible calibration data for the 18-NOV-1991 flight was computed using the incorrect method. That is, the slopes and intercepts were computed by the relationship

radiance = slope x scene_count + intercept

rather than

radiance = (slope x scene_count + intercept) / gain

As a result, visible data for the 18-NOV-1991 flight (MAS channels 2-6) has been multiplied by the gain for each channel. To correct for this, it is necessary to divide the radiance values for each channel (2-6) by the corresponding gain for that channel. It has been decided not to correct this problem in the dataset since new visible calibration data for FIRE flights is being developed by Tom Arnold at GSFC. As soon as this calibration data is available, all FIRE flights will be reprocessed using the updated visible calibration. It is planned to modify the processing software so that the calibration method used for each channel is encoded into the instrument configuration file.

(4) MAS data system upgrade

I spoke to Jeff Myers at Ames this week regarding the new data system to be used for the MAS. Jeff reported that the new Exabyte 8mm aircraft data system would be used for the ASTEX mission in June. The new data format will include the MAS and INS data in one merged datastream. This will necessitate a change in the software used to read the current Level-0 data sets. Jeff will send information on the new data format. I asked whether it would be possible to receive the Level-0 data on Exabyte tape, and Jeff said he would check into it. We would need to ensure that our Exabyte drives and tape reading software were compatible first. If this does not work, Jeff can still provide the Level-0 data on 9 track tapes.

(5) MAS data transfer to ASTER team

I received an email message from Simon Hook at JPL regarding the transfer of a sample MAS image. Simon was able to transfer a sample image of 1000 lines of MAS channel 2 data over Lake Tahoe (31-OCT-1991) and display it on his system without problems. The image was an 8 bit uncalibrated 'flat' image, which is available from the anonymous FTP site. He also intends to obtain the NetCDF code from UCAR so he can look at the calibrated, geolocated Level-1 flight line products.

Miscellaneous
Thomas E. Goff
2 April, 1992

teg@cheshire.gsfc.nasa.gov,
(301) 982-3704
tgoff on GSFC mail

* **Revision Control System** - UNIX computers have access to the Free Software Foundation, Inc programs known as RCS. This suite of programs handles the automatic stamping of revisions and change control to files that are resident on a UNIX computer system. (There is also an MS-DOS version). The facility uses a set of embedded character strings within each file that can contain the revision number and modification history. It is implemented as a change file containing the original version and the history of changes (deltas) to the original. This allows previous versions to be reconstructed in case a change is made that needs to be removed at a later date. In addition, the deltas can be in the form of a tree that can spawn new revisions in parallel with each other. A merge facility can then reconcile the differences. rcs is a friendlier facility to use than the sccs facility that is normally available on BSD (Berkeley) derived UNIX systems.

UNIX operating systems that derive from the AT&T UNIX system (not the Berkeley UNIX) have version 3 of the RCS facility as part of the vendor distribution. SGI IRIS's and HP's are derived from AT&T while SUN's are derived from Berkeley. The current RCS facility, sponsored by gnu, is up to revision 5.6 and is available for all UNIX computers by remote ftp. It works best with a special version of the UNIX diff program to construct the deltas within the revision file, which is also available from gnu ftp. The SGI iris we are currently using is due for an operating system update and it would be a waste of effort to install these programs at this time. When this is completed, it would be very desirable to have these facilities, as well as other programs such as gnu plot, ftnchek, Korn shell, Z-mail, Perl, etc, available to all users of the LTP computers.

The current revision 5.6 of rcs uses source code keywords that are different from the early 3.0 versions and is therefore incompatible with the early versions. I would like to use this facility to provide an automatic version control stamping that is compatible with both sccs and rcs. This will allow the use of both the what and rlog programs to display revision codes. These codes will be contained in the source code, the object (binary) files, and the executable programs. Revision codes in executable modules will be displayed for all components of the executable.

-- Miscellaneous --

& **SGI UNIX Mail** - Our SGI iris computer has two mail facilities, mail and Mail (case is significant). The man pages list a mail_att and mail_bsd, but we don't know which is

installed as mail (a version of the AT&T mail program is a good guess based on Usage parameters). Outside mail comes through the mail program and can be responded to, but not originated from. Originating a mail message must be performed by the Mail program. Hopefully this situation will be corrected by the new operating system. Note that there are public domain mail programs, used by almost all other computers systems, that perform better than these old AT&T and BSD programs.

& **SLIP Connection** - I have been unsuccessful, due to not being able to contact the right people, with establishing the procedures required to connect to the GSFC NCCS slip server, but I will keep on trying. An alternate method is to have a direct serial connection to any of the LTP UNIX machines via the existing Rohm patch board and having slip installed on the Unix machine. We have this software for Sun systems, but we need a cable from a sun computer to the switch board to complete the physical connection.

& **FORTRAN Source Code Checking** - Awaiting installation of FORTRAN-LINT on an LTP SGI computer with the X11 rev 4 windowing facility.

& **Future Source Code Checking Facilities** - There are several new programs appearing in the commercial market that can be used for code checking. I will try to keep a list of these programs and commercial sources for future reference. The availability of C++ and FORTRAN90 compilers is driving the code checking capabilities to new heights.

Risks in Porting MODIS Science Team Members' Algorithms

General

1.1 The software won't be delivered on time.

1.2 All of the software will be delivered at the last minute, causing an enormous increase in workload.

1.3 Team Members will be unavailable or unable to clarify unreadable code. The programmer will have moved on, and no one will understand the code.

Readability

2.1 The code will be poorly written and poorly documented, making it very difficult to read and understand.

2.2 Variable names will be cryptic and undocumented.

2.3 The standard prologue will be missing from some modules.

Portability

3.1 The software will not be written in Standard FORTRAN or Standard C.

3.2 The code will contain machine specific language extensions or "tricks" which won't work on the TLCF/PGS.

3.3 The internal and external data sets will not be machine independent.

3.4 The code will have been developed on a machine that we don't have access to.

Testability

4.1 Test drivers will not be provided, and testing will be labor intensive.

4.2 Test data and test results will not be supplied, or test cases will not be adequate. Test results will not be in a form which permits automated comparison.

4.3 Tests will not stress the algorithm. The algorithm will not fail gracefully.

4.4 The code will not be modularized sufficiently to allow comprehensive module testing. Excessive use of COMMON and EQUIVALENCE will make error tracing complex.

4.5 Error messages will be missing or inadequate.

PRELIMINARY DRAFT

MODIS SDST Deliverables

	Deliverable		Due Date
1	EOS Deliverables		
	1.1 MODIS Software and Data Management Plan		Jun 1992
	1.2 MODIS Team Leader Computing Facility Plan		Jun 1992
2	MODIS SDST Deliverables		
	2.1 Schedule		Apr 1992
	2.2 Project Plan		?
3	MODIS Airborne Simulator (MAS)		
	3.1 Version 1 Software	(V1.0)	Nov 1991
	3.2 Data Users Guide	(V1.0)	Jan 1992
	3.3 Data Catalog		Jun 1992
	3.4 Version 1 Metadata		Jun 1992
	3.5 Level-1 Processed Data		Jan 1991
4	MODIS Level-1 System		
	4.1 Level-1 Software Development Plan		?
	4.2 Level-1A System		
	4.2.1 Level-1A PDR Report		Jan 1993
	4.2.2 Level-1A CDR Report		Jan 1994
	4.2.3 Level-1A Test Plan		Oct 1994
	4.2.4 Level-1A Users Guide		?
	4.2.5 Level-1A System Description		?
	4.2.6 Level-1A System Delivery		Jul 1995
	4.3 Level-1B System		
	4.3.1 Level-1B PDR Report		Apr 1993
	4.3.2 Level-1B CDR Report		Jan 1994
	4.3.3 Level-1B Test Plan		Oct 1994
	4.3.4 Level-1B Users Guide		?
	4.3.5 Level-1B System Description		?
	4.3.6 Level-1B System Delivery		Jul 1995
5	MODIS Level-2/3 System		
	5.1 Coding Guidelines for MODIS TM Science Algorithms		April 1992
	5.2 MODIS Control Shell		
	5.2.1 SRR		Apr 1993
	5.2.2 PDR		Oct 1993
	5.2.3 CDR		Apr 1994
	5.2.4 Beta		Jan 1995
	5.2.5 V1		Jan 1996
	5.2.6 V2		Jan 1997
	5.3 TM Algorithm Integration Plan		?
	5.4 TM Algorithm Test Plan		?
	5.5 SDST System Delivery to PGS		
	5.5.1 Beta		Jul 1995
	5.5.2 V1		Jul 1996
	5.5.3 V2		Jul 1997